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ABSTRACT

The guide outlines modifications, adaptations, and social interaction approaches for school staff to use with physically handicapped and regular students in integrated classrooms in the province of Alberta, Canada. Guidelines are provided for the following main categories and subsets (in parentheses): lifting and transferring techniques (methods of lifting, preparation for a lift and transfer, and the standing transfer); positioning techniques (such as alternate sidelying) for the student to attain maximum potential and prevent development of deformities; activities of daily living (feeding, toileting, dressing, using mobility aids); nonverbal communication (using typewriters, writing aids, communication boards, and technical aids such as the Canon Communicator, a miniature typewriter); interaction with nonhandicapped students (using media, roles and techniques of therapists, and simulation exercises); and modifications of buildings (parking lot, walks, ramps, entrances/exits, washrooms, and classroom work surfaces). A short reference list is provided. (MC)

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the physically/medically handicapped student in the regular classroom

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A. INTRODUCTION

Students with medical or physically handicapping conditions represent an extremely heterogeneous group, the majority of whom can be served effectively in a regular classroom. It is important that the physically handicapped student be integrated into the regular stream of school and recreational life, so that he will be able to adjust more easily to the "normal" world as an adult because of frequent interaction earlier in his life. Integration also allows the majority group the opportunity to change their values and attitudes towards handicapped people through social learning situations. This section outlines modifications and adaptations which may be necessary and discusses methods of fostering appropriate interaction with non-handicapped students.

The primary goal is to help the student to see himself first and foremost as an individual who has many abilities and who, incidentally and lastly, is handicapped. It is obvious that cooperation between the teacher and the student's parents, doctor, therapists, and other resource staff is essential in fostering optimal growth for the student. Many resources are available and should be utilized fully to allow smooth integration of the handicapped student.

B. LIFTING AND TRANSFERRING TECHNIQUES

It is recommended that all staff working with these students consult a physio- or occupational therapist about lifting and transferring techniques. Teachers must protect their backs when lifting and transferring a student from one place to another.

1. Method of Lifting:

It is important to remember that you are lifting with your legs - <u>not your back</u>. Proceed as follows:

- bend knees;
- get a good secure grip on weight to be lifted;
- bring that weight close to your body;
- <u>keep your back as straight as possible</u>;
- lift by straightening your knees.

2. Preparation Prior to Doing a Lift and Transfer:

a. Make sure you have as much room as possible.

b. Plan where you are transferring the student <u>before</u> you begin, e.g. bean bag chair, floor mat, toilet.

c. Make sure your pathway is clear and safe, e.g. no objects you may trip over, floor not wet or slippery, no abrupt changes in floor level.

d. Size up your load. Consider the student's capabilities. Decide on type of transfer required:

(1) Standing Transfer;
(2) Two-Man Lift;
(3) One-Man Lift.

e. Put the adapted chair or wheelchair brakes on and check that it is secure.

f. Remove any chair parts that will hinder the lift, e.g. armrests, footrests, abduction pommel.

g. Unfasten the student's seat belt and any other safety straps, e.g. chest strap, foot straps.

Now you are ready to begin the transfer.

3. Standing Transfer:

Example: Transferring a student from wheelchair to toilet. Student is able to take some weight through his legs. Teacher must stand with a wide base, i.e. legs apart, to increase stability.

Standing positions for the teacher:

a. Walk Standing
- base increased in a front to back direction, i.e. feet apart with a good wide base; one foot forward, the other back;
- this position will withstand a force applied either from in front or behind.

b. Stride Standing
- base increased sideways;
- feet positioned as though standing at ease;
- this position will withstand a force from either side.

Method: Student - place hands on teacher's shoulders;
- lean forward to bring weight forward;
- place feet well apart on floor.

Teacher - stand in walk standing position facing student;
- position hands under student's arms in the axilla (underarm area);
- shift weight to front foot while keeping close to student;
- transfer weight to back foot as you lift student into standing position.

Teacher and student now standing with teacher giving necessary support.

Teacher - shift feet to stride standing (base increased sideways);
- pivot student and self until the back of the student's legs contact the toilet.

Teacher is now in a walk standing position due to the pivot movement.

Teacher - maintain a straight back;
- bring weight forward and slowly lower student onto the toilet by bending your front knee.

c. Two-Man Lift - Example: Transferring a student from wheelchair to floor mat.

Student very disabled and heavy, but with reasonable use of arms. Two staff members required. One person must be in command, e.g. "1, 2, 3", or "Ready - now lift".

Standing position for the staff - one person on each side of student;
- face each other;
- place feet apart with a good wide base.

Method: Student - place arms across the shoulders of the staff members;
- bend head forward with the hips and knees flexed.

Staff - place one arm across student's back to opposite side at waist;
- place other arm under both thighs;
- get a firm grip;
- bend your knees;
- keep your back as straight as possible;
- lift when command given;
- lift by straightening your legs;
- carry student to mat;
- on command, bend knees and slowly lower student to mat;
- kneel on mat, release grip on legs and then trunk as you slowly position student in a lying position.

Note: If size of student makes it impossible to grip waist and thighs, staff members must grasp each other's wrists with a firm grip.

d. Safety Tip - If at any point during the transfer, you start to lose your grip, inform your partner. If the student cannot be safely returned to the wheelchair or placed on the floor, then you both must immediately go down onto the floor on your knees and break the student's fall with your thighs. Serious injury should thus be prevented. Apply this when doing a One-Man Lift too.

e. One-Man Lift - Example: Transferring a student from floor mat to wheelchair; student severely disabled but small and lightweight.

Starting position for teacher: kneel on mat beside student.

Method: Teacher - assist student onto side lying facing away from you;
- position student with head bent forward and hips and knees flexed;
- place one arm behind student's shoulders and neck;
- place other arm under both thighs;
- get a firm grip;

- lift student onto your thighs bringing his weight close to your body;
- raise up onto one foot;
- keep back as straight as possible;
- now stand up lifting with your legs (be sure to have a wide base);
- get your balance and then carry student to wheelchair;
- stand at side of wheelchair facing it;
- bend knees and slowly lower student into wheelchair;
- make sure student is seated safely in wheelchair before you release your grip;
- secure safety straps and seat belt.

Apply the "Safety Tip", described with a Two-Man Lift, here also in order to break a student's fall.

In many cases, the students will be able to perform independent transfers. If a student is capable of doing an assisted transfer, the therapist will instruct the teacher in the method used. Independence is to be encouraged whenever possible. Several examples and techniques of transferring students have been described. It is most important, however, that the staff working with the student discuss transferring with the student's parents and therapist and learn the method that works best for that specific individual.

C. POSITIONING TECHNIQUES

Positioning is very important in efforts to help the student attain his maximum potential. The student must be comfortable and relaxed. An occupational therapist or a physiotherapist must be contacted to determine correct positioning techniques. Good support allows the student to concentrate on the task at hand. Proper positioning with good support helps:

- to prevent the development of deformities, e.g. joint contractures, joint subluxation, scoliosis and kyphosis;
- to inhibit unwanted postural and movement patterns while facilitating the more normal patterns;
- the student to feel and experience more normal movement;
- the development of eye contact;
- to encourage the use of the hands.

Symmetrical positioning with the head and shoulders in midline is essential.

Frequent position changes through the day are necessary to:

- aid respiration;
- promote better bowel and bladder functioning;
- prevent joint stiffness;
- promote relaxation;
- prevent a skin breakdown;
- provide a resting position.

The head, neck and spine are the key points used to manage students with abnormal muscle tone. If the student tends to throw his head back, do not press forward on the back of his head. Place your arm behind the student's shoulders and neck to bring the head forward from the base of the skull and the shoulders curled forward. Flexing and bending the hips and knees will also help to break up the abnormal extensor pattern.

Key points that are proximal, i.e. close to the trunk of the body, are used to facilitate desired movements. To relax tight or spastic muscles of the arm and facilitate opening of a clenched fist, place your hand over the elbow joint and turn the arm out in one movement. Slow, rhythmical movements promote relaxation. The elbow, then the wrist, fingers and thumb will relax and straighten.

To relax tight or spastic muscles of the leg with scissoring or crossing over, place your hands over the knee joints. Gradually and gently pull the legs apart and turn them out. Then bend up the foot and straighten the toes as well. It is important that these key points of control be used when changing a student's position.

1. Position Suggestions for Use in the Classroom:

a. Alternate Sidelying - Sidelying is the position of choice for many students. The student should be positioned and then supported with sandbags or a sidelayer. This position enables the student to bring his hands forward and together for hand activities. His legs should be flexed and relaxed.

b. Prone Position (Lying on Stomach) - The student is placed over a roll or wedge. Both arms must be forward to free the hands for activities. Head lifting and weightbearing on the forearms or hands are encouraged.

c. Adapted Seating Equipment - Floor seats, cornerseats or bolster seats may be used. They offer support in a good seated position and encourage independent sitting. Head and trunk control are improved. When used with small, low tables, the hands are in good position for work and play.

d. Adapted Standing Equipment - Prone boards, standing frames, or standing tables may be used. The upright position in a standing device stimulates bone growth; helps to control or improve joint contractures; promotes better head and trunk control; encourages better chest expansion in breathing and better kidned drainage. The student benefits psychologically by the change in position and by being at peer height. Appropriate work surfaces are used, as the hands are in good position to perform various tasks.

Before adopting the suggested techniques or equipment, the teacher should seek the advice of the student's parents and therapist. Each student requires an individual program. The teacher should check that the student is always comfortable and seated well. Contact the student's therapist if the student has outgrown the equipment or if he no longer appears to need the support it offers.

D. ACTIVITIES OF DAILY LIVING

1. Feeding: Most problems in eating will be related to problems in the total body, as in cerebral palsy. The most common problems, seen individually or together, include the following:

a. poor posture, lack of head or trunk control, poor sitting balance;

b. inadequate ability to suck due to weakness or spasticity of the oral musculature, lack of tongue control, overbite, uncontrolled jaw movements;

c. chewing difficulty due to improper muscle tone, teeth or gum problems, lack of tongue and lip control to keep food in the mouth, protruding lower jaw;

d. poor lip closure, with possible mouth breathing, drooling, and inability to purse lips to suck or blow;

e. difficulty swallowing due to structural defects, poor sucking, or tongue thrust (a pattern where the tongue is thrust forward during swallowing, usually pushing most of the food out with it);

f. hyperactive gag reflex;

g. reflexive bite, with immediate and strong biting of any object placed in the mouth;

h. lack of tongue control, with immobility or lack of lateralization, protection, retraction, elevation, or depression;

i. difficulty moving hand to mouth due to improper muscle tone, contractures, or structural deformities;

j. difficulty handling utensils or finger foods due to fine motor problems;

k. distractibility.

A suitable chair which keeps the hips and knees bent, shoulders and arms forward, feet flat on the floor or footrest and head symmetrical and slightly forward should be used. Feeding with the cerebral palsy student should not be started until he is relaxed and properly positioned.

Adaptive equipment which will increase independence of the most severely disabled student is available or can easily be made.

Independence in the most basic area of functioning is the goal providing that the methods that the student employs do not accentuate or increase the abnormal patterns that cause the problems. Every aspect of feeding can be broken down into simpler and more manageable steps. Curricula which task analyze self-feeding behaviors are available through school or Alberta Education libraries.

White, Wilson - Minor, and Connolly (1977), provide excellent guidelines for the correction of feeding problems, as does Finnie (1968). Further guidance can be obtained from a speech- or occupational therapist.

2. Toileting: Just as it is difficult to concentrate and learn in an uncomfortable position, it is impossible to be independent in toileting unless one is fully supported and relaxed. Toileting aids, e.g. raised toilet seats, grab rails, and commode chairs, may be extremely useful. If problems in transferring or sitting arrangement are encountered, a physio- or occupational therapist should be consulted.

3. Dressing: As in all areas of learning, there must be a readiness to learn the skills involved in dressing. The student must be able to follow verbal directions or imitate the teachers' movements, and relate the clothing to the appropriate part of the body. He must have adequate body balance to step into clothes or to learn to fasten them, or be able to lean or hold onto support. The spastic cerebral palsy arthritic, or arthrogryphotic student may be difficult to dress due to resistance to certain movements. Generally, it is easier to handle and dress such a student if he is sitting or lying on his side rather than lying on the back, which often tends to result in stiffening and increased spasticity. If he must be dressed on his back, a pillow should be placed under his head and shoulders. The following are some general points for teachers to overcome difficulties encountered in the more severely disabled:

a. Always put the clothes on the more affected, i.e. more spastic, arm or leg first and take them off the least affected side first. Do not try to pull the arm through or to straighten the arm by pulling on the fingers -- this will only cause the elbow to bend more;

b. Because of certain reflexes still present in the cerebral palsy student, it is important that he be sitting, lying, or standing as symmetrically as possible during dressing to prevent one side from stiffening;

c. Keeping the hips bent forward and the shoulders rounded will often make it easier to bring the arms forward and into an article of clothing;

d. Always bend the student's leg before putting on shoes and socks, as the ankle and foot are stiffer and pointed when the leg is straight.

4. Mobility: It is important that students with physical disabilities have the opportunity to explore their environment. Adapted aids and special equipment are required to provide independent mobility.

a. Braces - Corrective braces may be used to prevent or correct joint deformity during the student's rapid growth period. Support braces, e.g. parapodium, paraplegic braces, long leg braces, provide assistance for standing.

The teacher should notify the student's parent and therapist if repairs are required, e.g. torn leather, loose or missing screws, and if the student appears to have outgrown the brace, e.g. rubbing on body, student

complaining of discomfort. If the student has decreased or no sensation, check regularly for pressure marks. This will help to prevent the development of pressure sores. Skin breakdown often takes a long time to heal completely and the student may be absent from school for several weeks.

b. Crutches - Crutches or canes are necessary:

(1) to increase the size of base of the student and, therefore, the stability;
(2) to give support, for legs which are incapable of bearing the weight of the body.

The type of crutch used depends on the student's condition and strength. The main types are axillary, elbow, cane or tripod. These are adjustable in height and have rubber tips to prevent slipping. It is essential for safety and efficiency to have the crutches or canes the correct length.

Students must never lean on their crutches, especially if they are the high axillary type. This may cause pressure on the nerves supplying some of the muscles of the arms, resulting in weakness or even paralysis.

When using axillary crutches, the body weight is transmitted through the hands by extending the elbows and not by leaning on the armpits. The tops of the crutches should, however, be pressed against the sides of the chest.

When using elbow crutches, the body weight is transmitted through the hands by extending the elbows, while keeping the arms close to the sides of the body. Canes and tripods are also used in this manner.

Students walking with crutches should never be hurried, but should move with a steady rhythm. Special gaits (walking patterns) are taught by the physiotherapist, but the teacher should know which pattern the student is to use.

c. Gait Patterns

(1) a Swing to Gait is used by students who are unable to move their legs individually;
(2) a Swing Through Gait is a quicker gait used by students with very good balance but who are unable to move their legs individually;
(3) a Four-Point Gait is used by students who can take full weight on both legs, but who are unsteady and need a wide base of support;
(4) a Two-Point Gait is used by students who can take full weight on both legs and who have very good balance;
(5) a Three-Point Gait is used by students who can take full weight on on leg and have to take varying amounts of weight on the other leg. They may be partial weight bearing or non-weight bearing.

d. Stairs - If the student is unable to move his legs individually, then he may hop up and down the steps with both feet on the step at the same time. When ascending, his feet go first and when descending, his crutches are first. Both crutches or one crutch and the handrail may be used for support. Assistance may be required as very good balance and strength are necessary.

If the student is able to move his legs individually, he will always go up with the stronger leg first and down with weaker leg and crutches first. Once again, both crutches or else one crutch and the handrail will be used for support. Supervision may be necessary.

The teacher should notify the student's parents and therapist if any screws are loose or missing, if the rubber tips are worn and need to be replaced, and if the student appears to have outgrown the crutches. Students' complaints of arms, shoulder or hand discomfort should not be disregarded. The teacher should also consult with the therapist regarding the student's gait pattern and mobility on the stairs.

e. Walkers - Walkers offer mobility and stability. They assist with balance by providing support. Students lacking in balance or strength are able to walk by transferring weight through their hands.

Students with poor balance may use the sturdy Parallel Walker. It offers a wide base for support. It must be picked up to be advanced, so it is the slowest to use. If the student has fair to good balance, he may use the smaller based and lighter Adjustable Mini Walker. It must also be picked up to be advanced.

The wheeled A-Walker, though heavy, is faster and requires more skill to handle. Adjustable friction pads, installed in the castor housings, enable the ease of motion to be adjusted to meet the student's individual needs. The friction can be adjusted according to the surface, on which the student must walk, e.g. indoors or outdoors.

Students with physical disabilities which hinder them for using conventional walking aids, may be able to use the Pommel Walker. The Pommel Walker has a chest support and adjustable height pommel (seat sling). A removable pad fits behind the buttocks. It has a wide base and rests on four castors. The student is held upright and lower limb function is encouraged. Trunk and head control, balance and posture will also improve. A tray for school activities may be attached to the walker.

All of these walkers can be adjusted in height.

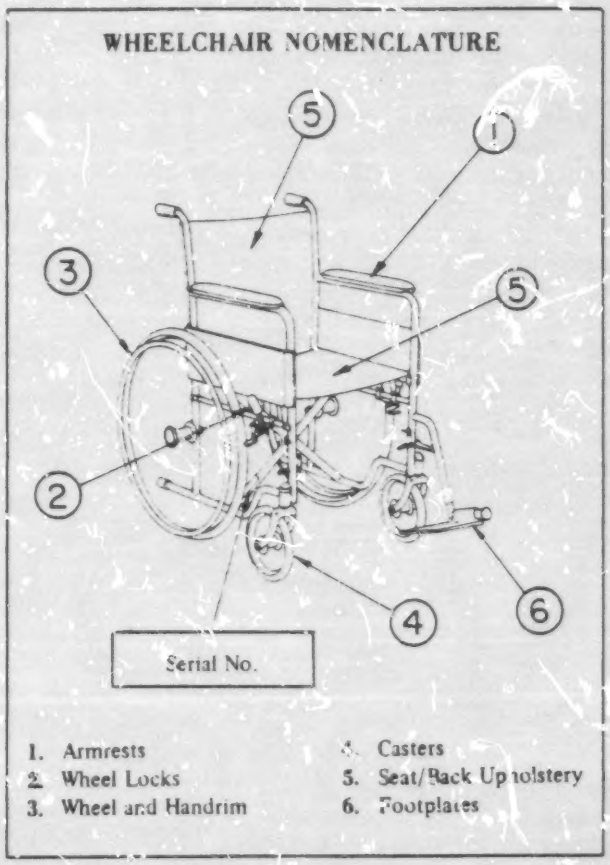
The teacher should notify the student's parents and therapist if any parts are loose or missing, if the rubber tips are worn and need to be replaced, if the castors are not functioning well and require cleaning or repairs, and if the student appears to have outgrown the walker. The student may improve and progress from one type of walker to another.

Young students may use a Crawler or a Castor Cart as a means of mobility. A crawler fully supports the body weight. Head control and the use of the arms and legs in a crawling pattern are encouraged. To use a Castor Cart, the student must have good use of his arms. The cart is propelled by pushing the wheels. This strengthens the arms as well as improving coordination, trunk control and balance. It also prepares the student for independent mobility in a wheelchair.

E. Wheelchairs

(From "Everest and Jennings Wheelchair Owner's Manual"):

(1) Wheelchair Illustration



(2) Handling a Wheelchair

(a) to open a folded wheelchair, tilt it to one side and push down on the sides of the seat on top of the seat rails;

(b) to fold a wheelchair, first fold up the footplates. Then tilt the chair to one side and lift upward on the upholstery beside the seat rails. Some chairs fold by lifting up on the carrying straps that are attached on either side of the seat upholstery;

(c) detachable armrests are removed in various ways. There may be a flip-lock pin that you must press down; a disengage lock pin that you push in or a button arm lock that must be pulled down as the armrest is simultaneously lifted upward;

(d) swing-away detachable footrests can either be moved out of the way as required or else removed entirely from the wheelchair. To move them out of the way, e.g. during a transfer, release the lock and swing the footrest outward and rearward. To detach it, lift up and off;

(e) to adjust the length of the footrest, loosen the bolt on the bottom of the telescoping shaft. It must be tightened securely after adjustment. Remember that the lowest part of the footrest must be at least 63 mm from the ground to permit proper clearance. To adjust elevation legrests, simply raise the legrest by lifting it up to the height which is under the legrest where it attaches to the wheelchair;

(f) a semi-reclining back reclines 30 degrees. To recline it, loosen the knobs on either side at the back of the wheelchair, adjust to the desired position, and then tighten securely. A full-reclining back reclines 90 degrees. To recline it, loosen the knobs on either side at the back of the wheelchair, pull up on the trigger and lock it into place. Tighten the knobs securely. Many wheelchairs have adapted modular seating systems and some students have special chairs which meet the needs of their specific physical disability. Consult the therapist for advice in handling these special chairs and electric wheelchairs.

(3) Safety Tips

(a) the student must always be safely secured in his wheelchair. Make sure the seat belts, safety straps and supports are secure and fastened at all times. Footrests must be in place;

(b) be sure the brakes (wheel locks) are on and the wheelchair is secure with the castors in forward position, before transferring a student in or out of his chair;

(c) students must not reach to the side or lean forward out of their chairs any farther than the length of their arm. Otherwise, tipping may occur;

(d) it is important that the students do not stand on the footplates when transferring as this could cause tipping. Either fold up the footrests, detach them or swing them to the side. The teacher should keep several screwdrivers and wrenches in the classroom. These could be used for minor emergency wheelchair repairs, e.g. tightening nuts and bolts for a footrest so that the student's feet would not be caught in the front castors. Any major wheelchair repairs, e.g. wobbling wheels, loose brakes, must be reported to the student's therapist and parents so that repairs may be made. Worn or torn wheelchair upholstery must be reported immediately because it may not support the student's body weight;

(e) when pushing a student in a wheelchair, always be sure that the student's feet are secure on the footrests and will not slip off. Also watch that their arms, hands and fingers will not be injured or entangled with the wheel spokes.

(4) Curbs, Doorsills, or Single Steps

The method for assisting a student in a wheelchair up a curb is:

(a) place your foot on the tipping lever extension and apply pushing force (down and under). At the same time, pull back and down on the two handgrips. Tilt the chair back until it requires little or no effort to stabilize it. That will be its balance point;
(b) now move the chair forward until the front castors are on the sidewalk;
(c) lift and roll the chair up over the curb as you push it forward. Do not let the chair roll back.

The method for assisting a student in a wheelchair down a curb is:

(a) tilt the wheelchair back to its balance point as in Step 1 "going up a curb";
(b) now move the chair forward and gently lower it down the curb;
(c) lower the front castors slowly to avoid jolting the student or damaging the chair.

The teacher should always approach the student's parents and therapist with any concerns or questions as they arise. Discussion and demonstration should solve any problems.

E. NON-VERBAL COMMUNICATION

1. Typewriters: For students with poor fine motor coordination, weak muscles, or limited range of movement in their hands or arms, typewriters may be necessary to allow adequate speed and legibility of written work. Electric typewriters are generally the most appropriate. Finger guards are available which prevent more than one key being struck at one time for the student whose movements are erratic. Although useful in the classroom, they are cumbersome to be used elsewhere for students who have no verbal means of communication.

2. Writing Aids: Although printing is usually taught before cursive writing, it is often easier for students with coordination difficulties to use cursive writing due to the smoothness and connective lines. Some students may have such poor grasp that they require adapted writing utensils. Some must be made for the specific student's needs and are usually prescribed by the occupational therapist but the following are several which can be made by the teacher:

- pencil holders made from clay, styrofoam balls, or plastic balls;
- writing frame which fosters correct position for writing;
- magnetic wrist hold-down;
- wrist weights.

In addition, some parts of the body may have more control than the hands and may be fitted with writing devices such as a splint for the forearm or a head pointer.

3. Communication Boards: It is essential that students who lack the ability to communicate verbally be given an alternate form of communication. Communication boards are one method often prescribed by the speech pathologist. A child's first communication board may be a picture board which would contain a representative line drawing or photograph of objects a child may need to ask for.

A high cognitive level of communication could be achieved with a Bliss Board. Blissymbolics is a visual graphic symbol system which provides a more comprehensive level of conversation. It may be used like a picture board to point to nouns desired, or it may be expanded to fit the cognitive level of the child including such concepts as verbs, adjectives, adverbs, opposites, and metaphors.

Another symbol system for those who can read is an English language communication board, which contains 26 letters and numbers 1-10. This system is very portable and may be used in conjunction with other communication boards. Its limitation is that both the sender and receiver must be able to read the message.

A communication board should be designed to be as portable as possible. It may be placed on a wheelchair tray or on a cardboard or plastic folder (lamination recommended).

If the student lacks the coordination to point accurately to the word or symbol wanted, either with a hand or some other body part, a system can be used to indicate the position of the symbol on the board, by color coding or numbering the horizontal and vertical rows.

It is important that the system of communication used is known to anyone who interacts with the student. There should be a card on the student's wheelchair and communication board that states his name, the fact that he cannot talk, the system used to indicate "yes" and "no", and how the communication board is accessed, e.g. "I will point to the symbol", "I will look at the number row I want", "I am very slow -- please wait for me to finish".

4. Technical Aids: Recent advances in electronics and increasing awareness of the need to assist the handicapped individual to reach his fullest potential has resulted in the development of technical aids which can be used with minimal motor strength or coordination. For example, there are adapted keyboards for typewriters, either expanded for the student using his whole hand or other body part or type, or condensed for the student with limited strength or range of movement. The Canon Communicator is a miniature typewriter (4.4 kilograms in total) worn on the wrist or wheelchair arm which prints out on a "ticker tape". There are several electronic communication systems which allow the severely disabled student to stop the indicator as it "scans" to the desired symbol, or to indicate directly the symbol to be used with minimal motor control. The hand device actually "speaks" with a synthesized voice when the key is struck. Although often expensive, these devices allow the student to communicate freely and dispel the appearance of being mentally handicapped because of an inability to speak.

F. INTERACTION WITH NON-HANDICAPPED STUDENTS

One of the teacher's major responsibilities in the education of a handicapped student is to promote acceptance and interaction with non-handicapped students. If the handicapped student is encouraged to participate in regular group activities and is not treated as an "unfortunate child", others will see that he is really more like than unlike other students. Utilization of resource staff and community agencies to assist the class in understanding and accepting handicapping conditions should be made.

There are many excellent books and audio-visual materials for use in the classroom. Bookbinder (1978) offers an excellent program designed to increase understanding of conditions. To prepare students for the entry of a physically disabled student, she suggests the following:

1. Use movies, slides, or pictures to "demystify" the visible aspects of the handicap;

2. investigate and use equipment and aids, such as wheelchairs, scooters, walkers, balance seats, braces, artificial limbs, therapy balls, communication boards, etc.;

3. present the roles and techniques used by therapists so that the students understand the necessity;

4. provide simulation exercises (such as walking with stiff legs or blindfolded);

5. allow opportunity to discuss feelings and fears.

Exercises which simulate difficulties in tactile discrimination (sorting by feel alone with socks over hands), visual discrimination, gross motor coordination (tie tubes around knees to prevent bending), auditory discrimination and perception, e.g. give many directions in rapid succession, and language acquisition (learn a symbolic language) can be used.

(See Stein, 1974, and P.A.T.H., 1978, for additional information and activities.)

G. BUILDING MODIFICATIONS

1. Parking Lot: Parking space, with easy access to the school entrance most suitable for students with physical disabilities, must be reserved. The parking space must be open on one side allowing room (3,600 mm width) for students in wheelchairs or with braces or crutches to get in and out onto a level surface. These students should have access to the school entrance without it being necessary to wheel or walk behind parked cars.

2. Walks: The public sidewalk should be at lease 1,200 mm wide with a gradient not greater than 5 degrees. A continuing common surface, not interrupted by steps or abrupt changes in level, is best. The walk on either side of the entrance must be level. A space at least 1,500 x 1,500 mm is necessary if a door swings out onto a platform.

3. Ramps: Ramps must have a smooth, hard, non-slip surface. The slope must be no greater than 300 mm rise in 3,600 mm of length. The surface must extend 300 mm beyond the top and bottom of the ramp with at least 1,800 mm of straight clearance at the bottom. One, preferably two, handrails are required. These must be 800 mm in height measured from the surface of the ramp.

4. Entrances/Exits: At least one primary entrance to the school must be usable by students in wheelchairs or students with other forms of physical disability. The doors must have a clear opening of no less than 800 mm when open and operate by a single effort. The doors should be easily pushed open and close slowly enough to allow use by physically disabled students. The floor on either side of the doorway should be level for a distance of 1,500 mm from the door in the direction the door swings. Sharp inclines and abrupt changes in level must be avoided at doorsills. Thresholds should be less than or equal to 12.5 mm. Door knobs should be at a minimum of 1,050 mm above the floor. Lever-type knobs are best.

5. Stairs: Stairs require handrails 800 mm high as measured from the tread at the face of the riser. The stairs must have at least one handrail that extends 450 mm beyond the top and bottom step. 175 mm or less is the recommended height of the step riser.

6. Floors: The floors on each storey should be at a common level or connected by a ramp. They must have a non-slip surface.

7. Washrooms: Turning space of 1,500 x 1,500 mm is required to allow traffic of students in wheelchairs. One toilet stall must be 900 mm wide and at least 1,400 mm (preferable 1,500 mm) deep. The door must be 800 mm wide and swing out. Grab bars 825 mm high and parallel to the floor, 40 mm in diameter, with 40 mm clearance between rail and wall, fastened securely to the wall at the ends and centre are necessary. A width of at least 1,200 mm between the wall and the front of the stall entrance is required. The toilet with the seat should be 500 mm from the floor. A 750 mm clearance from the floor is required for sinks with the drain pipes and hot water pipes covered or insulated. Tap-turning aids or special adaptations may be needed. Mirrors, towel dispensers, water fountains and disposal units must be at a heigh usable by students in wheelchairs. The teacher should meet with the student's parents and therapist to find out if special toilet seat or grab bar adaptations are required for that specific student. Assistance during toileting may also be required.

8. Elevators: If the school has more than one storey, an elevator would be a real asset. It should be easily accessible and usable by physically handicapped students with all of the controls 1,200 mm or less from the floor. The elevator itself must be at least 1,500 x 1,500 mm in size.

9. Classroom Work Surfaces: Proper sitting posture is extremely important to optimal performance of the student. Therapists will recommend specific adaptations to the individual's specific needs, but the teacher should ensure the following criteria are met for each student:

a. Desks or tables should be raised or lowered to allow wheelchairs to fit under them. In some cases, a wheelchair tray may be more appropriate.

b. Height should allow the elbows to rest easily on the working surface.

c. Feet must be placed flat and firmly on the floor or foot rest.

d. Some students may also have their own adapted seating arrangement (braces or wheelchair insert), but the teacher should be alert for improper seating:

   (1) sitting on spine rather than buttocks;
   (2) leaning to one side;
   (3) sitting with shoulders extremely rounded;
   (4) feet not supported.

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